U. S. DEPARTMENT OF AGRICULTURE

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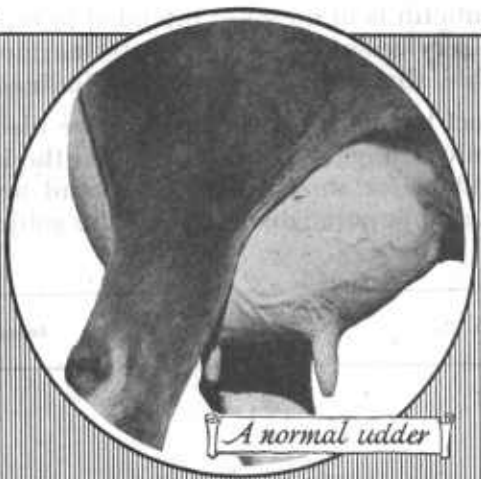
UDDER DISEASES of DAIRY COWS



A normal udder

THE MAINTENANCE of healthy cows with normal udders is of vital importance to the dairy industry.

A cow that is healthy in every other respect, but has a diseased or nonproducing udder, is worthless in a dairy herd. The prevention and treatment of the diseases which bring about this condition are discussed in this bulletin. The limitations of a bulletin of this kind preclude anything more than a brief discussion of each disease and a suggested line of simple treatment adapted to the means and condition of the average dairyman.

This bulletin is in no sense intended to replace the valuable services of the trained veterinarian, which, if available, should by all means be obtained.

An effort has been made to avoid fine distinctions and technical language in the hope that the information might better supply the widespread need of a practical and popular discussion of the subject.

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UDDER DISEASES OF DAIRY COWS.

By HUBERT BUNYEA, *Veterinary Inspector, Pathological Division, Bureau of Animal Industry.*

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CHARACTERISTICS OF THE UDDER.

A FUNDAMENTAL AXIOM of horse husbandry is well expressed in the statement "A horse is no better than his four feet." Translated into terms of dairy husbandry, it would sound much like this: "A dairy cow is no better than her udder."

Implied or expressed, this rule largely governs the desirability of animals considered for a dairy herd, or the fitness of any animal to remain in the herd. The attention of the stock judge is focused on the udder conformation as a guide to a cow's excellence, and the dairyman ultimately rates her value to him according to the evidence of the milk sheets and the butterfat test.

The dairy cow's udder is an abnormally developed gland, the result of centuries of careful selective breeding. It is complex in its physiology. Functioning as it does, under high tension, for maximum milk production during most of the adult life of the cow, this marvelous structure is subjected to a very great physical strain, with small opportunity for rest or repair. The extra tax on the udder which is involved in the birth of calves and shortly thereafter often counterbalances the rest allowed between milking periods.

The great development of this organ, as well as its complexity, are factors which render most difficult the treatment of abnormal conditions of the udder of the dairy cow. All things considered, it is usually advisable, when a disease or injury is observed, to undertake treatment only under the advice of a qualified veterinarian.

PREVENTION OF DISEASES AND INJURIES.

Many of the udder conditions which occasion pain and peril to the dairy cow are avoidable. Deviation from regular and established practice in the care of the animal is the frequent forerunner of serious consequences. Lack of care in the use of milking machines, teat dilators, and milking tubes may result in the permanent injury of one or more quarters of the udder. Brier cuts, barbed-wire cuts, and the bruising or crushing of the teats by other cattle stepping on them (often due to bad stall construction), are usually avoidable. These injuries may lead to leaky quarters, fistulous teats, mammitis, and other troubles, with possible loss of function. Udder troubles of cows are sometimes directly or indirectly traceable to brutal treatment by attendants who, in driving the animals to and

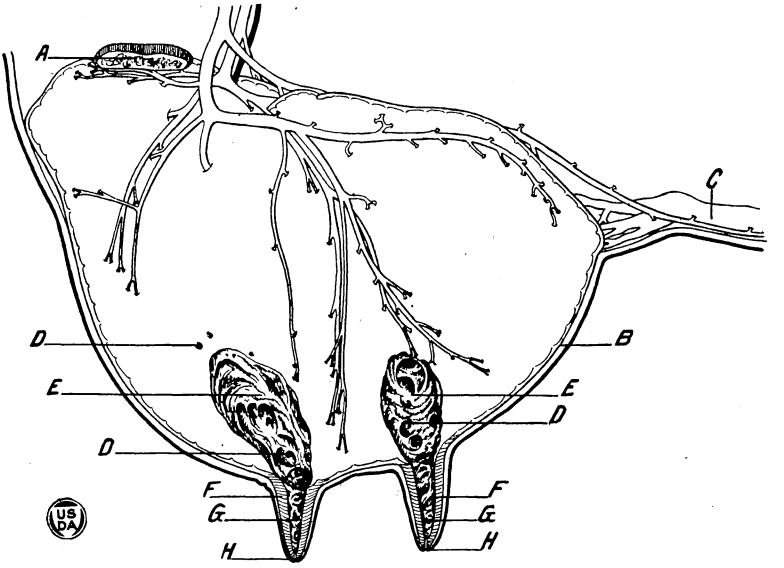

FIG. 1.—Diagram of one-half of the udder of the cow (adapted from H. C. Wilkie). *A*, supramammary lymph gland (in section); *B*, skin; *C*, subcutaneous abdominal vein (milk vein); *D*, openings of the milk ducts, of which there are a very large number opening into the milk cisterns; *E*, milk cisterns; *F*, walls of the teats; *G*, interior of the teats; *H*, orifice or opening of the teat.

from pasture, stone them or beat them with sticks, clubs, or whips. Vicious horned animals also inflict injury on their fellows, which may involve the udder as well as other parts of their bodies.

DRYING OFF THE COW.

Damage may result from attempting to dry off a cow too suddenly before calving, especially when the animal is on succulent pasture or a rich concentrated ration. In some cows the instinct for milk production is so highly developed that the function seems difficult to repress, even during advanced pregnancy, and efforts to terminate a milking period forcibly in such animals possibly do more harm than good.

To dry off a cow, it is advisable first to regulate her ration. Allow well-cured hay in place of succulent pasture, silage, or beet pulp. By stages eliminate all concentrates, for at this time they tend to excite a congested condition of the udder, as well as to favor the continuance of milk production. Bran may be given alone or with some middlings. For about a week omit every third milking, and then milk once daily for another week, without stripping. Afterwards it may be necessary to milk only a few streams daily to relieve the tenseness of the udder. A few days later, when it is evident that milk secretion has subsided, no further attention will be required, as a rule. This system may be varied to suit individual cases, as some animals may be dried off in less time, while others may require longer.

SEPARATION OF COW AND CALF.

Although there are excellent reasons for the common practice of promptly removing the newborn calf from its dam, it is sometimes advantageous to leave them together. The cow often comes to her milk more naturally and easily with the calf present. The calf discovering its own appetite and then the maternal fount at which it is to be satisfied, begins punching and bunting the udder in a manner well calculated to stimulate the flow of milk and at the same time to "break up" the congestion of the organ. Possibly many a case of mammitis in fresh cows might have been avoided had the calf been left beside its dam until the udder was well "broken up."

VICES.

Some calves acquire the habit of sucking the udders of other calves, a prank which should never be tolerated, despite the apparent harmlessness of it. The possibility of damage is twofold. In the first place it tends to the formation of an ill-shaped and pendulous udder, and hence may seriously detract from the beauty and value of the animal in afterlife. Furthermore, there is the danger that the heifer, especially if of well-bred dairy stock, may become stimulated to a virgin milk secretion. In the course of events this milk secretion, the presence of which is not suspected, may be left to dry up of its own accord, without the necessary care on the part of the owner, with a ruined udder as the possible result. This fact may, indeed, account for many of the cases of hardened udder reported among virgin heifers, since the description of that condition is strongly suggestive of chronic garget of adult cows. To overcome the vice the milk ration of calves may be followed by a handful of grain fed before they are turned out. This tends to remove the desire to nurse.

Cows sometimes acquire the habit of sucking their own teats. While this practice may not harm the cows it is unprofitable for the owner.

There are several more or less effective ways of breaking cows of the habit of sucking their own udders or the udders of other cattle. Some herdsmen have used the common calf weaner (fig. 2*a*), which is a small, biblike attachment for the nose, or the muzzle basket type of calf weaner (fig. 2*b*), either of which contrivances is so arranged as not to interfere with eating or drinking, but which covers the

mouth when the head is slightly elevated. Others have resorted to the use of the spiked halter, which is made by perforating the muzzle strap of an ordinary leather halter at intervals of about 1 inch and passing sharpened wire nails through the holes, from within outward, lastly lining the barbed strap to hold the spikes in place. This method, however, borders on the barbarous and may be attended with danger to the wearer or to other stock in the same pasture. A crib, or rigid collar (fig. 3*a*), is more humane, and may be made by lacing together a number of stout sticks in barrel-stave fashion, and tying them around the animal's neck, thus preventing her from bending sidewise and yet permitting her to graze. This apparatus is mainly effective for animals that rob their own udders. Another type of apparatus (fig. 3*b*), which is effective in preventing a cow from robbing her own udder, consists of a halter, to the chin strap of which a stout stick is attached by means of a short chain. The stick is passed between the forelegs and is fastened at the other end by a large metal ring to the lowest point of a girdle fitted comfortably around the animal's body.

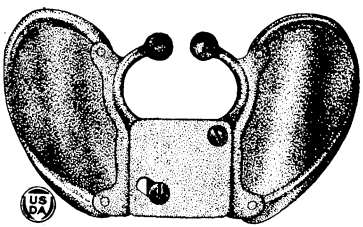

FIG. 2*a*.—A calf weaner. A device on the market for placing in animal's nose.

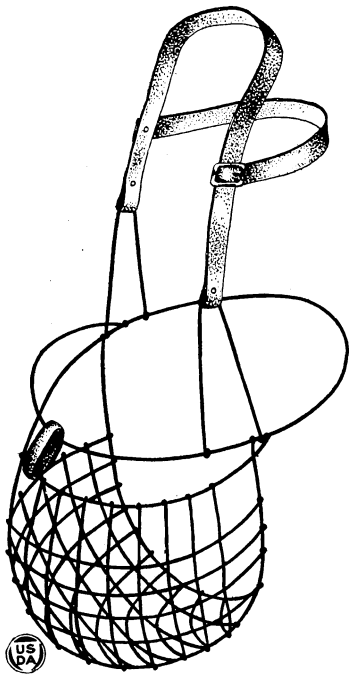

FIG. 2*b*.—Muzzle basket type of calf weaner.

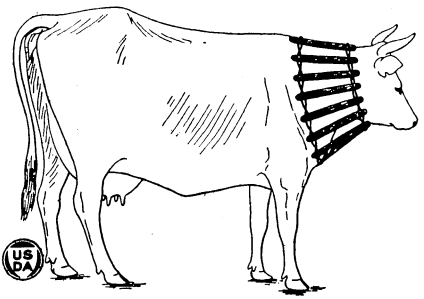

FIG. 3*a*.—A crib, or rigid collar, as applied to prevent a cow from sucking her udder.

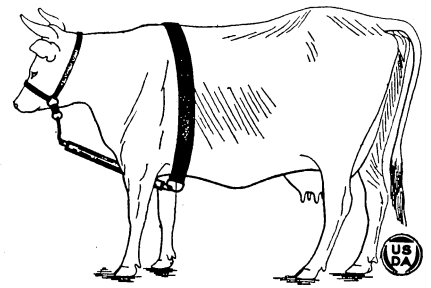

FIG. 3*b*.—Another form of antisucking apparatus.

If mechanical contrivances fail to correct the vice, the culprit may be isolated for a while, or, better still, pastured for a limited time

daily under observation or isolation, immediately after milking, and then stanchioned for the rest of the time. After a few weeks of this manner of restraint she should manifest no inclination to return to the habit.

DISEASES AND CONDITIONS AFFECTING THE UDDER.

INFLAMMATION OF THE UDDER (MAMMITIS, MASTITIS, GARGET).

By far the most important disease of the udder is that known as mammitis, mastitis, garget, or inflammation of the udder. The disease assumes three forms, namely, catarrhal, parenchymatous, and interstitial. The first attacks the mucous lining of the udder, the second the milk-secreting structures, and the last the framework of the udder. These differ in some of their characteristics, and in an individual case all may appear at various stages of the disease.

Causes.—Inflammation of the udder may be due to any cause or combination of causes, such as exposure to cold or wet weather, sudden change of temperature, blows, kicks, bruises, or abrasions of the udder, an injudicious allowance of rich feed, the retention of milk, infrequent or irregular milking, the introduction of contaminated instruments into the udder, local infection, indigestion, or any serious disturbance of the animal's health.

The disease sometimes appears in a mild form which soon passes off, to recur at more or less regular intervals. Although the condition usually occurs about calving time there is no part of the milking period in which it may not appear.

Symptoms.—In different forms or stages of the disease there may be a variation in the symptoms. The usual ones are general depression and discomfiture. There is sometimes chill, but it may escape notice. Among the most conspicuous symptoms are a rough coat, dull eyes, loss of appetite, suspended rumination, and possibly constipation. The animal stands in an awkward, straddling position, and moves about or lies down with reluctance and great difficulty, owing to the soreness of the udder, which will usually be found to be hot and tense, very hard, and tender. The fever, though sometimes local, is more likely to be general. A dropsical condition under the skin of the abdomen is sometimes observed.

The secretion of milk is partly or entirely suspended. The milk itself is lumpy or stringy, or its consistency may be altered to that of a serous fluid containing yellowish clots, caused by the coagulation and separation of the casein. The secretion may even become purulent and offensive. Severe inflammation of the udder may also bring about a rupturing of some of the capillaries, which makes the milk bloody.

Recovery may be slow or rapid, complete or incomplete. When the disease passes into a chronic stage there is small likelihood of complete restoration of function. Among the unfavorable results of the chronic condition are hardening of some of the udder tissues, abscess formation, milk fistula, and gangrene of the udder.

Treatment.—Chill, if observed, may be treated by the administration of large quantities of warm drinking water, or of cordial drenches, or by hot bathing, or the use of hot blankets.

To reduce fever, give 1 ounce of spirits of nitrous ether three times daily. A full dose of Epsom salt (1 to 2 pounds) may be given at

the onset of the disease, to be followed by daily doses of saltpeter, 1 ounce, and bisulphite of soda, 2 drams, in 1 quart of water, as a drench.

The udder should be completely emptied every two hours if possible, using extreme gentleness in the operation, especially if there are blood tinges in the milk. The presence of blood indicates a rupture of some capillaries. If the udder is very tender, it may be necessary to use a sterile milking tube so as to empty the organ with the least pain.

Twice daily, after milking, the udder should be bathed for about 20 minutes with water as hot as the hand can bear, and meanwhile the attendant should continue gently but firmly to massage the udder in a downward direction. All material brought down into the milk cistern by this manipulation should then be thoroughly stripped out, after which the udder should be dried and anointed with warm cam-

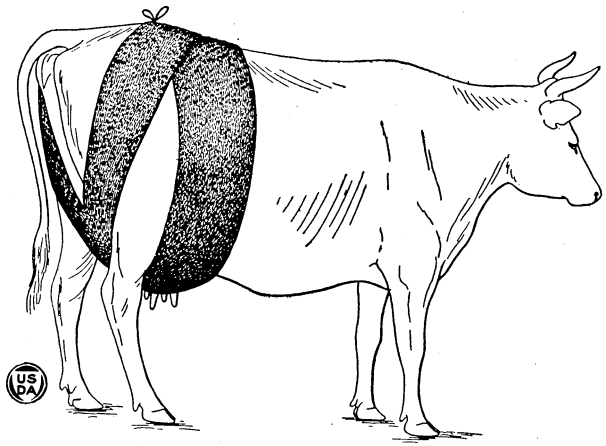

FIG. 4.—Method of applying a suspensory bandage to the udder.

phorated oil or an ointment composed of the fluid extracts of belladonna and phytolacca, 1 part each, and lard or lanolin, 8 parts. An excellent ointment may be prepared after the following formula:

Petrolatum	2 pounds.
Spirits of camphor	2 ounces.
Spirits of turpentine	2 ounces.
Oil of peppermint	½ ounce.
Carbolic acid	½ ounce.
Powdered extract of belladonna leaves	6 ounces.

This is to be mixed thoroughly and applied with massage daily after bathing the udder with warm water. The ointment may be rubbed in thoroughly and the udder should be supported by a dry suspensory bandage having holes cut in the lower part for the teats (fig. 4). The udder may be irrigated daily by means of a sterile milking tube attached to a sterile fountain syringe containing a 1 per cent solution of table salt [1] or a 4 per cent solution of borax, or

[1] A 1 per cent solution of common salt in boiled water at body temperature makes a suitable irrigating fluid. A heaping tablespoonful of dry salt weighs approximately 1 ounce, and this amount in 1 gallon gives the proper strength.

boric acid, sterilized by boiling and cooled to blood heat. The irrigating fluid may then be milked out with further massage.

In infectious mammitis beneficial results have been reported from the administration of one-half ounce of sodium salicylate and 2 drams of boric acid in 1 quart of water morning and night as a drench, and one-half to 1 ounce of formalin in 1 quart of milk or oil at noon for several days. Very frequent milking is also here recommended.

At every stage of the treatment of infectious mammitis a mild but effective antiseptic solution should be applied to the udder and adjacent parts of the affected cow, and also to the hands of the milkers and to the udders of other animals likely to be exposed in any way to the infection.

Affected animals should be separated from the herd, and hand-milked last, or, better, by a separate attendant. They should be maintained under sanitary conditions in dry, comfortable quarters, with frequent change of clean bedding, and other attentions given in the proper care of sick animals. The ration should be regulated so as to include a sufficient allowance of nutritious roughage, such as clover, alfalfa, cowpea hay, and to reduce the concentrate ingredients, such as corn meal, cottonseed meal, linseed meal, gluten, and middlings. Clean drinking water should be accessible at all times and should be slightly warmed in cold weather. A moderate amount of bodily exercise is beneficial provided it is taken voluntarily by the cow. Compulsory exercise may be positively detrimental as well as painful to the animal.

INDURATION, OR HARDENING OF THE UDDER.

Probably the most common of the results of mammitis, or inflammation, is induration, or hardening of the udder. This condition is due to structural changes in the udder tissue. During mammitis the secreting portion of the udder is in a diseased and wasting condition and the inflammation present appears to establish an increase of the connective-tissue cells which go to make up the supporting framework of the organ. The result is likely to be a large, ill-shaped and pendulous udder. In a well-established case of induration the milk secretion is usually very greatly diminished for that period. Sometimes the secretory function is permanently lost, or decreased to such extent that the animal no longer will be profitable in a dairy herd.

Treatment.—Treatment consists mainly in prolonged hot bathing of the udder twice daily after milking, accompanied by gentle rubbing of the parts affected. After drying the udder thoroughly, apply an ointment composed of lanolin or lard into which has been incorporated 2 per cent of iodin.

A rich diet, or one likely to stimulate milk secretion, should be avoided until inflammation has subsided, after which time the animal should be brought by degrees to a full, milk-producing ration. Maintain throughout a rather laxative condition of the bowels by an occasional dose of Epsom salt (about 1 pound).

ABSCESS OF THE UDDER.

Abscess is also one of the possible results of infectious mammitis, and is due to infection of the organ by pus-producing germs. The abscess may work toward the surface of the udder, where it can be assisted to a head and lanced by the veterinarian, or it may be ruptured internally and discharge its creamy, liquid pus through the teat. In the event of both external and internal rupturing of an abscess of the udder, there is danger of establishing a milk fistula.

Treatment.—The abscess may be hastened to a head by hot fomentations or poultices. It is then ready to be opened and drained. The aftertreatment usually consists of simple cleanliness in the general care of the animal and the dressing of the part twice daily with a watery solution containing 5 per cent each of glycerin and phenol.

GANGRENE OF THE UDDER.

Gangrene is caused by a serious interference with the blood circulation, as in some cases where the inflammatory swelling or distention with milk is so great as to produce intense pressure on the blood vessels of this region. The resulting slow, necrotic process causes the death and sloughing off of the affected quarter or quarters. This condition sometimes leads to fatal consequences, due to blood poisoning.

Treatment.—The raw surfaces should be thoroughly and frequently sponged with some good antiseptic, such as a one-half per cent solution of chloride of zinc. If amputation of the gangrenous area becomes necessary, it should be undertaken only by one skilled in surgical procedure.

TUBERCULOSIS OF THE UDDER.

Usually tuberculous infection of the udder may be distinguished from other udder infections by its gradual onset and chronic course, as well as the fact that it rarely occasions the animal any pain or inconvenience. Tuberculosis of the udder usually commences well up in one or both rear quarters, and may involve the lymph glands situated above and back of the two rear quarters of the udder. The organ itself becomes progressively hard and swollen, sometimes acquiring enormous size. Milk secretion appears normal until the infection has progressed considerably, when the milk becomes thin, watery, and scanty, and contains flaky and stringy material, and possibly blood and pus.

This disease, however, may go on unrecognized for years; meanwhile the animal continues to yield milk containing tubercle bacilli, thus endangering the health of other livestock as well as human lives. In case of mammitis that is considered possibly of tuberculous origin, it is advisable to isolate the individual and have the tuberculin test applied at once.

There is no known cure for this disease. In the diagnosis of tuberculosis of the udder no single method is completely satisfactory. The tuberculin test may be relied upon to demonstrate the presence of the disease in the animal, but it is impossible by this means to detect the location of the infection. If a physical examination of the

udder corroborates the positive tuberculin reaction, added significance may be attributed to the suspicion of udder tuberculosis. Finally, milk samples from suspected udders may be submitted to a bacteriological laboratory for examination.

Actinomycosis of the udder, caused by the same organism as lumpy jaw, is not so common as tuberculosis, but is sometimes mistaken for it. Definite diagnosis requires a bacteriological examination.

COWPOX.

Cowpox is an acute, contagious disease accompanied by a slight fever and a typical eruption which is usually confined to the teats and udder of the cow. The lesions first appear as small, red papules or nodules, which later resemble blisters and are filled with a clear fluid. The third or pustular stage is marked by the change in the character of this fluid to a puslike appearance and consistency. The fourth stage is that of drying or desiccation of the pustules.

The disease is usually spread by the hands of the milker and may break out on the cow about seven days after exposure. Cowpox is so mild and so lacking in serious consequences that in many herds its presence is either totally ignored or at least is taken for granted. Nevertheless the presence of the sores on the udders and teats renders milking somewhat painful to the cow. To avoid aggravating and prolonging the condition, therefore, the operation of milking should be accomplished with great gentleness, and may be facilitated by the use of the milking tube. The milk should be discarded.

Treatment.—The animal so affected should be isolated and milked last, with usual antiseptic precautions to protect the hands of the milker from the infection. Twice daily the affected area should be bathed with a 3 per cent solution of granular hyposulphite of soda. Once every day or two the pustules may be touched with tincture of iodin or a 5 per cent solution of silver nitrate.

CHAPPED TEATS.

Chapped teats are caused by any irritation, such as sudden chilling after the sucking of the calf, "wet milking" by the attendant, damp or filthy conditions in the stable, wet bedding, overstocking, exposure of tender skin to sun rays in summer, or freezing in winter, etc. The skin is first rough and inclined to scale, and later wrinkles are formed, which become hard and deep and presently break into raw fissures.

Treatment.—Favorable conditions, such as dry quarters and bedding, cleanliness of the udder, and "dry milking," should be assured. Some reliable antiseptic wash may be used, after which the chapped surface should be painted (once daily) with compound tincture of benzoin or a mixture of 1 part of tincture of iodin and 4 parts of glycerin. It may be advisable to anoint the teats with petrolatum before milking, and to use a sterile milking tube so that the milk may be drawn with the least pain to the animal.

WARTS.

Warts on the teats and udder form an annoying disfigurement as well as an obstacle to milking. While perhaps harmless them-

selves, they may lead to abrasions or fissures, thus exposing the skin of the animal to the invasion of blowflies or infections.

Treatment.—Long warts may be removed by twisting or tying a silk thread tightly about the base of the growth. The wart will eventually slough off.

Repeated applications of glacial acetic acid or other caustic to the body of the wart have been successfully used in the removal of such growths. Care must be observed, however, to restrict this treatment to the objectionable growth, as these chemicals are very injurious to healthy skin. As a precaution, the normal area around each wart may be previously coated with petrolatum or tallow. A safer treatment is to paint the warts with collodion containing 15 per cent of salicylic acid. The collodion film is removed every 3 days and the growth is recoated until it finally sloughs off. The simple application of castor oil at two-day intervals is also said to be effective in killing warts.

Some warts require surgery for their removal. In such cases the aftertreatment consists in painting the wound once or twice daily with tincture of iodin until well healed.

TUMORS.

Tumors in the teat or milk cistern may be harmless growths or simple connective-tissue enlargements due to interstitial mammitis or to a degeneration of the gland accompanying age. As a rule these growths are better not interfered with unless they become so large as to obstruct the milk flow or otherwise inconvenience the cow. Sometimes they may be reduced by the persistent external application of the tincture of iodin or an iodin ointment. If their surgical removal becomes necessary it should be undertaken only by one skilled in the principles of veterinary surgery, and not until the cow has been dried off. Under the most favorable circumstances, surgical treatment of the udder involves the danger of a serious infection of the organ.

Tumors within the body of the udder, and sometimes in the milk cistern, may be tuberculous. Such a suspicion may be dispelled only by the animal's failing to react to the tuberculin test. A tuberculous growth in the udder is beyond remedy and constitutes a real menace to the health of persons and livestock. Seek veterinary advice.

STRICTURE, OR HARD MILKING.

Hard milking is due to an obstruction or stricture, sometimes within the milk duct, but usually at the teat orifice. It may be brought about by a tenseness of the teat orifice, or by scar formation following an injury of the teat.

Treatment.—There are on the market several types of teat dilators, any one of which may be of benefit in correcting this condition. The dilator may be inserted an hour or two before milking, but the instrument should be sterile and the teat thoroughly cleansed before its insertion. After milking, the affected teat should be massaged with petrolatum into which 10 per cent of the fluid extract of belladonna has been incorporated. The alternate use of the ointment and the dilator should be continued until the condition appears to be corrected.

When this treatment fails it may become expedient to resort to surgical measures for the relief of the stricture, but this is done to better advantage after the cow has been dried off, involving a better prospect of prompt healing, and less likelihood of causing a dangerous infection or a leaky teat. The instrument used for this operation is known as a teat bistoury, consisting of a small shaft containing a concealed blade. After the bistoury is thrust well into the teat the blade is uncovered and the instrument is rapidly withdrawn, thus severing the obstructing tissues at one stroke. This procedure is usually repeated three or four times in each teat that is hard to milk, turning the blade in different angles each time. Great care must be exercised to have the instrument sterile for this operation, to avoid introducing infection into the udder. A word of caution to be taken into consideration is that this operation may result in an excessively large teat orifice, and is sometimes productive of the unfortunate condition known as leaky quarter.

ATRESIA (BLIND OR IMPERFORATE TEATS).

Atresia is a defect existing from birth, and is seldom, if ever, discovered until after the heifer has freshened. The owner's suspicion is first aroused when one or more quarters become abnormally large, hot, and painful, while the efforts of the calf to obtain nourishment are evidently unsuccessful. Examination usually reveals the fact that the teat orifice is wanting, but there will be seen clearly a distinct ring surrounding the slight depression where the teat orifice should be.

Treatment.—Treatment is obviously surgical. The orifice may be artificially established by means of a large, sterile needle or a small-bladed knife thrust through the sterilized skin perpendicularly at the center of the depression.

To prevent closure by healing, it is advisable to insert a milk tube, with usual precautions as to sterilization, at milking time, and to replace it between milkings with a sterile teat dilator, or even a strand of antiseptic tape, to act as a seton.

Healing may be promoted by the application of an ointment of the balsam of tolu, or the fluid extract of belladonna and glycerin. Should the opening become sealed during the healing process, it will become necessary to repeat the process already described.

INSECT STINGS.

Cattle are more or less liable to the stings of bees, wasps, or hornets while grazing among clover, alfalfa, or other blossoms. The udder is a frequent point of attack because it is not so well protected by hair as other parts of the body, and, on account of its pendulous position, is more readily accessible to the aroused insect. The sting injects beneath the victim's skin an actively poisonous secretion which is highly irritating and which may eventually prove detrimental to the health and life of the skin. Insect stings, when inflicted in sufficient numbers, have been known to produce a severe, nervous depression, or even the death of the victim.

Treatment.—The injured area should be bathed in a 4 per cent solution of ammonia or a potassium permanganate solution. Internal stimulants may be administered in the form of fluid extract of nux vomica, one-half dram, three times daily.

SNAKE BITES.

The symptoms of snake bites are local swelling and inflammation, suppression of milk, fang wounds, systemic weakness, depression, blue membranes, and later coma or convulsions and possibly death. In the event of survival, abscess formation or sloughing of tissue at the point of injury may develop later.

Treatment.—Thoroughly cleanse the wound with dilute ammonia or a 1 per cent potassium permanganate solution. Endeavor to prevent the absorption of venom by the excision of the wound, cauterizing it, or painting it freely with tincture of iodin. The effect of the toxin on the system should be combated with internal administrations of alcohol, coffee, digitalis, strychnin, or aromatic spirits of ammonia. An antitoxin for the counteraction of snake bites has been placed on the market.

WOUNDS OR CONTUSIONS.

Wounds of the udder may be caused by barbed-wire cuts, brier cuts, nail snags, long and jagged finger nails of milkers, bites of dogs, the trampling of teats under the hoofs of other cattle, high barn doorsills, fence jumping, goring, etc.

Treatment.—Cleanse the wound and keep it clean. If the skin is laid open or the wound is gaping, the underlying tissue should be thoroughly cleansed with an antiseptic solution, the hair should be shaved or clipped from around the injury, and the lips of the wound should be brought together and held in position by means of sutures or strips of adhesive tape. Tincture of iodin should be applied at intervals. In case of pus formation, suitable drainage should be provided, and the wound dressed frequently to prevent the germ-laden discharge from reaching the teat orifices, as such a contingency might involve the infection of one or more quarters, with disastrous consequences.

LEAKY QUARTER AND FISTULA.

When a heavy-milking cow comes up to the barn with milk dripping or streaming from one or more of her distended quarters, the wise keeper realizes that the animal should be milked three or even four times daily instead of twice. Cows of only moderate production may likewise leak milk at times if their milking is long delayed or their capacity of retention is otherwise abnormally taxed. Persistent loss of milk through teat leakage, however, is not only annoying but very unprofitable for the owner.

Chronic leaking is probably due in most cases to weakness of the teat orifice, to a fistula of the teat, or to the effects of a previous operation for the relief of stricture or other teat obstruction.

Weakness of the teat orifice may be overcome sometimes by the local application of tincture of iodin or saturated alum solution twice daily. The common practice of stopping a leaky teat with a rubber band or tape, or inserting a plug between milkings, is inadvisable, as it only tends to aggravate the weakness of the part or to increase the size of the opening. Flexible collodion, into which has been incorporated 1 or 2 per cent of metallic iodin, may be used to seal the teat orifice, twice daily, or immediately after milking.

Teat fistula, due to injuries, constitutes a common and annoying form of teat leakage. Efforts to reduce a teat fistula, however, had better be postponed, if possible, until the milking period of the animal has been terminated. The procedure, which is a surgical one, consists in scarifying the edges of the fistulous opening, bringing the lips together, and suturing them into place to establish a closure of the aperture by healing. This operation should not be attempted by one unfamiliar with the principles of surgery, however, as skill and surgical cleanliness are absolutely necessary, while at the best there always remains the danger of establishing a serious infection of the gland. The aftercare consists in bathing the wound several times daily with a sterile 1 per cent solution of table salt or a mild antiseptic solution.

If a cow in full flow of milk should receive a barbed-wire cut or other injury to the teat which would probably develop into a fistula, the correct procedure would be to suture the wound immediately rather than to await the drying off of the animal and risk the consequences of a leaky quarter. The milking tube under these circumstances should always be inserted before attempting to draw milk from an injured teat.

Rudimentary extra teats should never be removed surgically unless for a compelling reason, as it is a very common source of leaky udders.

BAD FLAVORS AND ODORS OF MILK.

Bad flavors and odors of milk are multitudinous in their nature and origin. Some cases are unquestionably brought about by unsuitable feed in the stall or pasture, others probably result directly from a diseased condition of the gland, while in many cases bad flavors and odors are caused by contaminated milk pails.

Occasionally a cow that is within from one to three months of calving yields milk that imparts a bitter taste when made into butter. Cattle on an impoverished pasture may yield bitter, bad-smelling milk as a result of consuming large quantities of some acrid or pungent weed. An excessively rich stall feeding, if long continued, may in time bring about undesirable flavors in the milk.

In case the milk of all cows in the herd is bad flavored, the probability is that the feed is the cause. If on inspection only a few individual animals are found to be yielding milk that is off in flavor or odor, it is the condition of these animals that is most likely responsible. If, however, the odor and flavor are at first normal, and after the milk has been allowed to stand for awhile become objectionable, the explanation will probably be found in infected milk pails or cans rather than in unsuitable feed or diseased udders.

To overcome such conditions it is first necessary to detect and remove the cause. If due to diseased udders, the animals may be isolated for treatment. If due to errors in feeding, the errors must be rectified. If due to bacterial contamination, it must be prevented by the thorough sterilization of receptacles, and other measures of sanitation in the routine operation of milking.

BLOODY MILK.

Bloody milk is a symptom of any of the following conditions: Mammitis, injury to the udder, hardening or induration, tuberculous

infection of the udder, the eating of acrid or irritant feed, or an excessive allowance of protein feed. The operation of milking also may aggravate a tendency to hemorrhage if the udder is injured or inflamed.

Treatment consists in determining the cause, if possible, and in applying the remedial measures found elsewhere in this bulletin. The application of the following general treatment may be sufficient to afford relief in mild cases:

Completely milk out the udder at least four times daily, at regular intervals; bathe the udder with cold water, then dry and apply camphorated oil to the quarter with gentle massage; avoid an excessively rich diet; encourage the animal to utilize as bulky a ration as is consistent with her milk production; administer an occasional dose of Epsom salt (about 1 pound) as needed, also a half ounce of saltpeter once daily. Should the hemorrhage persist, inject several ounces of a sterile 2 per cent tannic acid solution at blood heat into the affected quarter by means of a milking tube attached to a fountain syringe.

Redness of milk which does not appear until several hours after milking is probably due to contamination of the milk with some one of the chromogenic (color-producing) organisms.

ROPY MILK.

Milk sometimes is ropy, stringy, or slimy. The cause may be in some irritant forage to which the cattle have access, or other error of feeding, or the condition may be of bacterial origin.

Treatment.—Affected animals should be stall-fed on a properly balanced ration, or pastured on an abundant, suitable growth in a well-drained meadow. Each animal may receive a daily drench of Epsom salt, 2 ounces, and bisulphite of soda, 2 drams, in 1 quart of water.

If the unnatural condition is found to be acquired after the milk is drawn, it is probably due to lack of cleanliness at some stage of the handling of the milk. In this event, efforts should be directed toward the disinfection of utensils, and other sanitary measures.

The prompt pasteurization of new milk at a temperature of 140° F. for 30 minutes should protect it from becoming viscous or assuming other undesirable properties ordinarily attributable to bacterial action.

MILK STONE, OR CALCULUS.

Milk stone, or calculus, is a term loosely applied to concretions in the udder. Some stones are formed by coagulated casein and may be an indirect result of udder inflammation, while others are simply accumulations of lime salts from the milk, which sometimes may be distinguished by the occasional discovery of gritty particles in the bottom of the milk pail or on the strainer cloth.

Treatment.—After a prolonged, gentle massaging of the teat extremity with an ointment containing 10 per cent of the fluid extract of belladonna leaves, the concretions, if not very large, may be passed with the aid of a sterile spring teat dilator. The injection of a small quantity of sterile olive oil into the teat may assist materially in the removal of the obstructions. In case the stones can not be removed

in this way it may be necessary to remove them by means of an opening in the side of the teat. This operation should not be undertaken by the inexperienced layman, as the danger of seriously infecting the udder by insanitary procedure can not be overestimated, as well as the extreme likelihood of leaving a fistulous, leaky teat. Unless the concretions are sufficiently large to constitute an obstruction, their surgical removal, even by a veterinary surgeon, had far better be postponed until the cow has been dried off.

AGALACTIA, OR SUPPRESSION OF MILK.

The disease known as agalactia, or suppression of milk, is not infectious in cattle, as it is in sheep and goats. Neither is it so common. Occurring, as it usually does, at calving time, agalactia seems to be unfavorably influenced by such predisposing causes as indigestion, loss of appetite, mammitis, insufficient or unsuitable feed, plant poisoning, severe insect stings on the udder, thirst, enforced driving, fear or excitement, or the removal of the calf. Incidentally, agalactia is a reliable symptom seen in rabies in the cow.

Treatment.—The animal, if a heifer, should first be examined for the possibility of atresia, or imperforation, of the teats. Eliminating this possibility, the attention should be directed toward determining, if possible, the contributing cause or causes, which should receive prompt attention.

The animal should be surrounded with an environment most conducive to her comfort and complete satisfaction. She should be supplied with an abundance of fresh, clean, drinking water, and have a generous allowance of a ration, preferably in the form of a warm mash, calculated to stimulate milk secretion. Milk secretion may be assisted by the repeated administration of strychnin, one-half grain, and pilocarpin, 1 grain, in water at five-hour intervals, until six doses have been given. Massaging the udder with lard or an ointment containing extract of belladonna leaves may assist in bringing her to her milk. Efforts should be made to milk her twice daily, at regular milking time, even though the efforts are unrewarded. If the calf is brought to her side shortly before milking time, this additional appeal to her maternal instinct may have the desired effect.

MILK FEVER, PUERPERAL FEVER, OR PARTURIENT APOPLEXY.[2]

Milk fever sometimes follows calving in fleshy or heavy-milking dairy cows. It is characterized by its sudden appearance and its acute course. The animal becomes paralyzed and passes into a semiconscious or unconscious condition, which may terminate in death. The cause of the disease is unknown, but that it is predisposed by such causes as a highly developed milk production, an excessively nourished condition, and lack of exercise, is beyond question.

The symptoms of milk fever are characteristic and easily recognized. Soon after calving, the cow may exhibit signs of excitement and anxiety, after which constipation and colicky symptoms may be

[2] A fuller discussion of this disease is contained in Farmers' Bulletin 206, "Milk Fever, Its Simple and Successful Treatment," copies of which may be obtained from the Office of Publications, United States Department of Agriculture.

manifest. The owner may notice a staggering gait and weakness, especially of the hind quarters. Eventually the cow, no longer able to maintain the standing position, goes down and assumes the posture so characteristic of this disease (fig. 5), with the hind legs extended forward and the head thrown back toward the flank. A comatose condition may ensue, during which there is danger in attempting to administer medicine by the mouth, as the throat muscles are temporarily paralyzed and the material may pass into the windpipe and lungs. Pulse and respiration are weak and the temperature is more frequently subnormal than otherwise. Death or recovery will occur within two or three days, or even less.

Prevention may be favored by the following measures. When the cow is dried off prior to calving she should be placed on a light ration of bran and a little oatmeal, supplemented with suitable hay and possibly some succulent roots or an occasional feed of silage or beet pulp. She should be housed in a dry, comfortable, well-ventilated stable, amid sanitary surroundings, properly bedded, and given sufficient and regular exercise daily up to the time of calving. Several days prior to calving she should receive a full dose of Epsom salt.

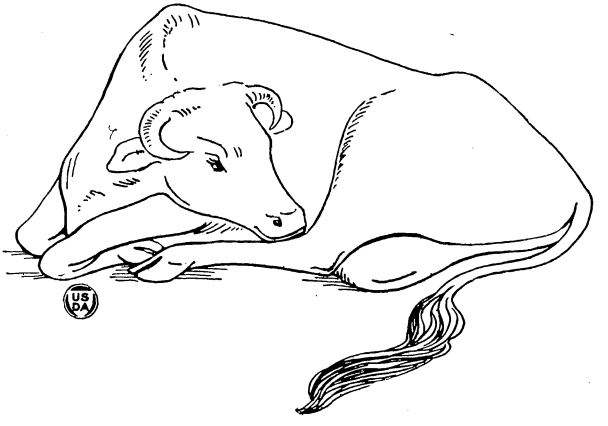

FIG. 5.—Characteristic attitude of a cow with milk fever.

Treatment.—This consists in the inflation of the quarters of the udder with sterile air and tying the teats with broad tapes until several hours after the animal regains its feet. The operation must be performed with the utmost regard for cleanliness. A clean cloth should be laid beneath the udder, which is then washed clean and sterilized with 5 per cent carbolic-acid solution.

The apparatus (fig. 6) consists of a rubber-bellows arrangement attached to a rubber tubing, which in turn is connected with a hollow-metal cylinder containing sterile cotton for the filtration of the air. Another rubber tube is attached to the other extremity of the metal cylinder, and at the other end of the rubber tube is the metal teat catheter. The last tube and metal catheter should be thoroughly sterilized by boiling and the hollow-metal cylinder should be loosely packed with sterile cotton.

The catheter is then inserted into one of the teats of the previously disinfected udder, and the rubber bulb is operated by re-

peated compressions until the quarter is well inflated. Massage of the quarter during inflation will assist in filling the recesses of the gland with the sterile air. The catheter is then withdrawn and the teat tied with broad tape. After the inflation of all four of the quarters the veterinarian will have opportunity to attend to any complications which may have arisen, or to administer hypodermic doses of strychnin, caffein, or other stimulants which may be indicated. Medicinal treatment is usually superfluous, however, in uncomplicated cases of milk fever. Following the sterile-air treatment alone, it is no uncommon experience to find the cow on her feet from 30 to 60 minutes later, eating hay as though there had never been the slightest disturbance of her normal condition.

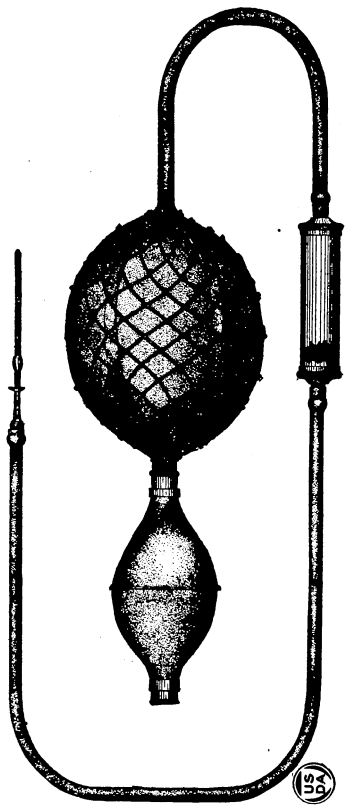

FIG. 6.—Apparatus, used in treatment of milk fever, for injecting sterile air into the udder.

Should the first treatment fail to give relief, the procedure should be repeated, as the air previously injected may have escaped or become absorbed. Following recovery, the tapes may be removed in about 5 hours. The air should remain in the udder for 24 hours, after which time it should be completely extracted by the manipulation used in milking. It is then safe to permit the calf to suck.

The milk-fever apparatus described above may now be obtained from many sources, as, for instance, dairy-supply houses and mail-order concerns. Every herd owner should possess such an outfit as a matter of insurance.

ORGANIZATION OF THE UNITED STATES DEPARTMENT OF AGRICULTURE.

February 12, 1924.

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